CLAIMS

1. A process for the manufacture of mouldings that are crosslinked in a mould at least to a degree sufficient to be released from the mold, in which process a crosslinkable material that is in a state in which it is at least partially uncrosslinked is introduced into the mould, the mould having a cavity determining the shape of the moulding to be produced and being at least partially permeable to an energy suitable to cause the crosslinking by impingement of the energy upon the at least partially uncrosslinked material, wherein the impingement of the energy causing the crosslinking upon the at least partially uncrosslinked material is restricted to the cavity and wherein the edge contour of the moulding is determined substantially by the spatial restriction of the energy impingement, so that a moulding is produced free from burrs or flashes.

2. A process according to claim 1, wherein the spatial restriction of the energy impingement is effected by masking of the mould, the masking being at least partially impermeable to the energy causing the crosslinking.

3. A process according to claim 1, wherein the energy employed to cause the crosslinking is radiation energy.

4. A process according to claim 3, wherein the radiation energy is in the form of a substantially parallel beam.

5. A process according to claim 1, wherein the mould used is one that is highly permeable at least at one side to the energy causing the crosslinking, and the spatial restriction of the energy impingement is effected by parts of the mould that are impermeable or of poor permeability to the energy causing the crosslinking.

8. A process according to claim 1, wherein the mould is not fully closed after the introduction of the material into the mould cavity, so that at least a gap containing uncrosslinked material remains open, which gap is in communication with the mould cavity and preferably surrounds it, and wherein the energy causing the crosslinking is kept away from the material disposed in that gap.

9. A process according to claim 8, wherein the mould is closed further following crosslinking shrinkage as crosslinking of the material progresses.

10. A process according to claim 8, wherein a material that is of at least viscous flowability prior to crosslinking is used, and a reservoir that is not impinged upon by the energy causing the crosslinking is provided from which material can flow back through the gap into the mould cavity to compensate for shrinkage.

11. A process according to claim 1, wherein, after the moulding has been released from the mould, any uncrosslinked or only partially crosslinked material adhering to the moulding is removed by washing with a suitable solvent.

12. A process according to claim 1, wherein the mould is closed without force, so that the two mould halves lie against one another without external pressure.

13. A process according to claim 1, wherein the filling of the mould cavity is carried out with the mold at least partially immersed in the starting material that is at least partially still in the uncrosslinked state.

14. A process according to claim 13, wherein, for filling the mould cavity, the cavity is connected to a reservoir which surrounds it, in which the starting material is stored and from which the mould cavity is flooded.

15. A process according to either claim 13, wherein the mould is closed in the starting material.

16. A process according to claim 13, wherein a mould is used that comprises a container and a mould member that is displaceable in that container and can be moved away from and towards the container wall lying opposite it for the purpose of opening and closing the mould, starting material being fed in between the container wall and the mould member as the mould is opened and conveyed away again as the mould is closed.

17. A process according to claim 16, wherein a mould having two mould halves is used in which one mould half is provided on the container wall and the other mould half is provided on the displaceable mould member.

18. A process according to claim 17, wherein a mould having a male mould half and a female mould half is used, the male mould half being provided on the container wall and the female mould half being provided on the displaceable mould member.

19. A process according to claim 16, wherein pumps are used to feed in and convey away the starting material.

20. A process according to claim 16, wherein the displaceable mould member is driven in order to feed in and convey away the starting material.

21. A process according to claim 13, wherein the crosslinked moulding can be released from the mould by flushing out the mould with starting material.

22. A process according to claim 16, wherein the crosslinked moulding can be released from the mould by flushing out the mould with starting material, and

wherein the moulding is separated from the mould by the flow of starting material as the mould is opened and is flushed out of the mould by the flow of starting material as the mould is closed.

23. A process according to claim 21, wherein in a first cycle the mould is opened and closed again, then at least the crosslinking necessary for it to be possible for the moulding to be released from the mould is effected by the impingement of energy and, in a second cycle, the mould is opened again, the moulding being separated from the mould and the mould member then being moved back towards the opposite-lying container wall again in order to close the mould, in the course of which the crosslinked moulding is flushed out of the mould.

24. A process according to claim 13, wherein the crosslinked moulding is removed from the mould by means of a gripping device.

25. A process according to claim 16, wherein the crosslinked moulding is removed from the mould by means of a gripping device, and

wherein the moulding removed from the mould by the gripping device is deposited on the displaceable mould member outside the space between the displaceable mould member and the opposite-lying wall.

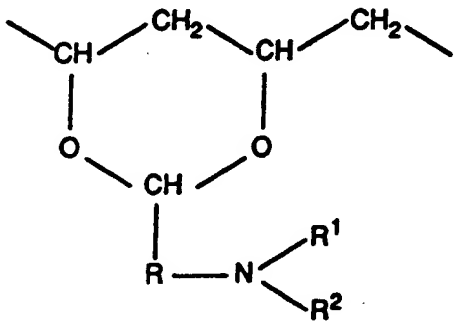
26. A process according to claim 25, wherein the moulding deposited on the displaceable mould member is held fast thereto by negative pressure and then released from it by positive pressure.

27. A process according to claim 13, wherein the mould is not fully closed after the introduction of the starting material into the mould cavity, so that an annular gap containing uncrosslinked starting material remains open, which gap surrounds the mould cavity and is in communication with that mould cavity.

28. A process according to claim 27, wherein the mould is closed further following crosslinking shrinkage as crosslinking of the material progresses.

29. A process according to claim 28, wherein a starting material that is of at least viscous flowability prior to the crosslinking is used, and wherein starting material can flow back through the annular gap into the mould cavity to compensate for shrinkage.

30. A process according to claim 1, wherein the starting material is a prepolymer that is a derivative of a polyvinyl alcohol having a molecular weight of at least about 2000 that, based on the number of hydroxy groups of the polyvinyl alcohol, comprises from approximately 0.5 to approximately 80 % of units of formula I



(I)

wherein

R is lower alkylene having up to 8 carbon atoms,

R^1 is hydrogen or lower alkyl and

R^2 is an olefinically unsaturated, electron-withdrawing, copolymerisable radical preferably having up to 25 carbon atoms.

31. A process according to claim 30, wherein the starting material is a prepolymer wherein R^2 is an olefinically unsaturated acyl radical of formula R^3-CO-, in which R^3 is an olefinically unsaturated copolymerisable radical having from 2 to 24 carbon atoms, preferably from 2 to 8 carbon atoms, especially preferably from 2 to 4 carbon atoms.

32. A process according to claim 3 1, wherein the starting material is a prepolymer wherein R^3 is alkenyl having from 2 to 8 carbon atoms.

33. A process according to claim 30, wherein the starting material is a prepolymer wherein the radical R2 is a radical of formula II

$$-CO-NH-(R^4-NH-CO-O)_q-R^5-0-CO-R^3 \qquad (II)$$

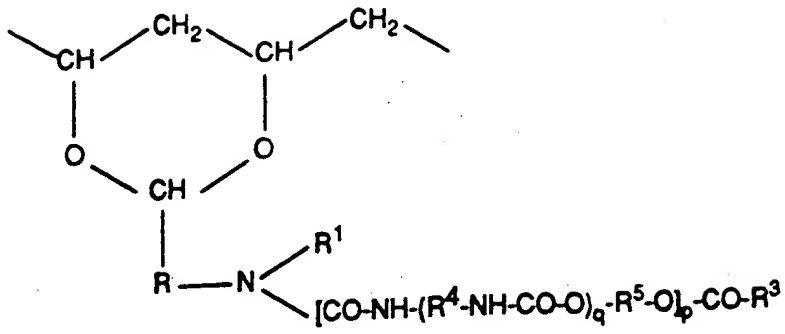
wherein

q is zero or one and

R^4 and R^5 are each independently lower alkylene having from 2 to 8 carbon atoms, arylene having from 6 to 12 carbon atoms, a saturated divalent cycloaliphatic group having from 6 to 10 carbon atoms, arylenealkylene or alkylenearylene having from 7 to 14 carbon atoms or arylenealkylenearylene having from 13 to 16 carbon atoms, and

R^3 is an olefinically unsaturated copolymerisable radical having from 2 to 24 carbon atoms, preferably from 2 to 8 carbon atoms, especially preferably from 2 to 4 carbon atoms.

34. A process according to claim 30 wherein the prepolymer is a derivative of a polyvinyl alcohol having a molecular weight of at least about 2000 that, based on the number of hydroxy groups of the polyvinyl alcohol, comprises from approximately 0.5 to approximately 80 % of units of formula III



(III)

wherein

R is lower alkylene,

R^1 is hydrogen or lower alkyl,

p is zero or one,

q is zero or one,

R^3 is an olefinically unsaturated copolymerisable radical having from 2 to 8 carbon atoms

and

R^4 and R^5 are each independently lower alkylene having from 2 to 8 carbon atoms, arylene having from 6 to 12 carbon atoms, a saturated divalent cycloaliphatic group having from 6 to 10 carbon atoms, arylenealkylene or alkylenearylene having from 7 to 14 carbon atoms or arylenealkylenearylene having from 13 to 16 carbon atoms.

35. A process according to claim 34, wherein the starting material is a prepolymer wherein

R is lower alkylene having up to 6 carbon atoms,

p is zero and

R^3 is alkenyl having from 2 to 8 carbon atoms.

36. A process according to claim 34, wherein the starting material is a prepolymer wherein

R is lower alkylene having up to 6 carbon atoms, p is one,

q is zero,

R^5 is lower alkylene having from 2 to 6 carbon atoms and

R^3 is alkenyl having from 2 to 8 carbon atoms.

37. A process according to claim 34, wherein the starting material is a prepolymer wherein R is lower alkylene having up to 6 carbon atoms,

p is one,

q is one,

R^4 is lower alkylene having from 2 to 6 carbon atoms, phenylene, unsubstituted or substituted by lower alkyl, cyclohexylene or cyclohexylene-lower alkylene, unsubstituted or substituted by lower alkyl, phenylene-lower alkylene, lower alkylene-phenylene or phenylene-lower alkylene-phenylene,

R^5 is lower alkylene having from 2 to 6 carbon atoms and

R^3 is alkenyl having from 2 to 8 carbon atoms.

38. A process according to claim 30, wherein the starting material is a prepolymer that is a derivative of a polyvinyl alcohol having a molecular weight of at least about 2000 that, based on the number of hydroxy groups of the polyvinyl alcohol, comprises from approximately 1 to approximately 15 % of units of formula I.

39. A process according to claim 1, wherein one half of the mould is used as packaging for the contact lens.

40. A device for the manufacture of mouldings comprising:

a closable and openable mould defining a mould cavity which is capable of determining the shape of a moulding to be produced therein, wherein the mould is at least

partially permeable to an energy suitable to cause crosslinking of a crosslinkable material to be introduced into the mould;

a source of energy suitable to cause crosslinking;

means for causing impingement of the energy upon the mould, wherein the means for causing the impingement of the energy upon the mould is arranged such that the energy is restricted to the mould cavity and that the edge contour of the moulding is determined substantially by the spatial restriction of the energy impingement, so that a moulding is produced free from burrs or flashes.

42. A device according to claim 41, wherein the mould comprises two mould halves which are separated along a separating face, and wherein the mask is arranged outside the mould cavity on one of the two mould halves and/or on both mould halves in the region of the separating face.

43. A device according to claim 42, wherein the source generates UV radiation and wherein at least one of the halves of the mould consists of UV-permeable material.

44. A device of claim 43, wherein the mask consists of a layer of material that is impermeable to UV radiation.

45. A device according to claim 40, wherein the mould is provided with spacers which hold the two mould halves a small distance apart from one another when the mould is in the closed position, so that at least a gap is formed that preferably surrounds the mould cavity and is in communication with that cavity, and wherein the mask is arranged in the region of the gap.

46. A device according to claim 45, wherein the mould is provided with resilient means or displacement means that allow the two mould halves to move closer together following crosslinking shrinkage.

47. A device according to claim 40, wherein during filling of the mould cavity the mold is at least partially immersed in starting material that is at least partially still in the uncrosslinked state.

48. A device according to claim 47 which comprises a reservoir for supplying the starting material, which reservoir surrounds the mould cavity and can be connected to the mould cavity, and wherein during filling of the mould cavity the reservoir is connected to the mould cavity and floods that cavity.

49. A device according to claim 47, which comprises means for closing the mould while the mould is at least partially immersed in the starting material.

50. A device according to claim 47, wherein the mould comprises a container and a mould member displaceable in that container, which mould member can be moved away from and towards the container wall lying opposite it for the purpose of opening and closing the mould, and wherein there is provided in the container an inlet through which starting material flows in between the container wall and the mould member as the mould is opened, and wherein there is rovided in the container an outlet through which starting material flows out again as the mould is closed.

51. A device according to claim 50, wherein the mould comprises two mould halves, one mould half being provided on the container wall and the other on the displaceable mould member.

52. A device according to claim 5 1, wherein the mould comprises a male mould half and a female mould half, and wherein the male mould half is provided on the container wall and the female mould half is provided on the displaceable mould member.

53. A device according to claim 50, wherein pumps are provided which, as the mould is opened, feed in starting material through the inlet and between the container wall and the mould member and, as the mould is closed, convey it back through the outlet.

54. A device according to claim 50, wherein means are provided for driving the displaceable mould member.

55. A device according to claim 47, wherein means are provided for producing a flow that separates the moulding from the mould when the mould is opened and flushes the moulding out of the mould when the mould is closed.

56. A device according to claim 50, wherein means are provided for producing a flow that separates the moulding from the mould when the mould is opened and flushes the moulding out of the mould when the mould is closed, and

wherein, in a first cycle, starting material first of all flows in through the inlet and between the container wall and the displaceable mould member and then flows back out through the outlet, the source for the energy then acts upon the mould with an amount of energy necessary for it to be possible for the moulding to be released from the mould, and then, in a second cycle, starting material flows in through the inlet and between the container wall and the displaceable mould member separates the moulding from the mould and then flushes it out through the outlet.

57. A device according to claim 47, wherein a gripping device is provided which removes the crosslinked moulding from the mould.

58. A device according to claim 50, wherein a gripping device is provided which removes the crosslinked moulding from the mould, and

wherein the container comprises, on a container wall other than the shape-giving face, a hollow or recess that extends substantially in the direction of movement of the displaceable mould member, the gripping device being arranged in that hollow or recess, and wherein the displaceable mould member comprises, on an outer wall that does not lie opposite the shape-giving container wall, an indentation in which the gripping device deposits the removed moulding.

59. A device according to claim 58, wherein the displaceable mould member comprises a channel that leads to the indentation and can be connected to a negative pressure or positive pressure source, which channel is connected to the negative pressure source when the gripping device deposits the removed moulding in the indentation of the mould member and then is connected to the positive pressure source in order to release the lens.

60. A device according to claim 5 1, wherein the mould is provided with spacers that hold the two mould halves a small distance apart from one another when the mould is in the closed position, so that an annular gap is formed that surrounds the mould cavity and is in communication with that cavity.

61. A device according to claim 60, wherein the mould is provided with resilient means or displacement means that allow the two mould halves to move closer together following crosslinking shrinkage.

63. A process of claim 1, wherein said molding is an optical lens.

64. A process of claim 1, wherein said molding is a contact lens.

81. A process of claim 80, wherein said ophthalmic lens is a contact lens.